14 CFR 125 / 135 Aviation Rule Making Committee
Training Subcommittee

Issue - 14 CFR 135.331(c)

Sec. 135.**331** Crewmember emergency training.

(c) Each crewmember must perform at least the following emergency drills, using the proper emergency equipment and procedures, unless the Administrator finds that, for a particular drill, the crewmember can be adequately trained by demonstration:

(1) Ditching, if applicable.
(2) Emergency evacuation.
(3) Fire extinguishing and smoke control.
(4) Operation and use of emergency exits, including deployment and use of evacuation chutes, if applicable.
(5) Use of crew and passenger oxygen.
(6) Removal of life rafts from the aircraft, inflation of the life rafts, use of life lines, and boarding of passengers and crew, if applicable.
(7) Donning and inflation of life vests and the use of other individual flotation devices, if applicable.

14 CFR 135.331(c) requires that crewmembers perform emergency drills using the proper emergency equipment and procedures, unless the Administrator finds that, for a particular drill, the crewmember can be adequately trained by demonstration. FAA Order 8400.10 provides guidance on the use of mock-ups for conducting emergency drill training.

To conduct the required emergency exit drills without the use of a mock-up, an aircraft must be removed from revenue operations or coordinated with maintenance actions in progress. Removing aircraft from revenue operations for training is highly inefficient.

Certain corporate aircraft require upholstery / trim removal to reduce the chance of damage prior to training. This may be as much as two (2) hours of maintenance technician time per training event for each aircraft type.

Training Schedules present additional challenges. At a large operation, in the worst-case scenario, crewmembers operating multiple aircraft types are represented in a training class. In such cases, it may be necessary to remove several aircraft types from revenue operations for training. On the opposite end of the spectrum, an operator with only a few aircraft may be required to remove fewer aircraft from revenue service to accomplish training; however, these aircraft represent a greater proportion of the fleet. In either case, the opportunity cost associated with not having the aircraft available for revenue service is significant.

While the highest level of care is exercised during training exercises, damage to aircraft is inevitable. Damage to items such as trim, upholstery, lights and door seals result from repeated opening and replacing of emergency exit doors.

While most training damage would be obvious at the time of training, it is not always, i.e. door seal damage as a result of replacing the emergency exit door. In all cases, damage is usually expensive to repair and may present increased risk to the crew and passengers operating the aircraft following the training event.

If door seal damage is detected prior to releasing the aircraft back to revenue operations, it may be necessary to hold the aircraft out of revenue operations for at least 24 hours while the replacement seal is installed and the bonding allowed to cure.

Undetected damage to door seals on aircraft returned to service may vary in severity but could lead to unanticipated pressurization problems. The costs associated with these types of service interruptions are difficult to quantify due to possible loss of revenue and other issues, not to mention the negative customer experience and potential loss of repeat business.

Most aircraft require a maintenance technician to reinstall the door correctly after removal. Time required to re-installed the door depends on aircraft type and if trim reinstallation is required often averages between 45 – 60 minutes.

In typical real life evacuation situations, an aircraft standing on all landing gear would most likely not represent the resting position of the fuselage. In many cases, the fuselage would be closer to the ground, partially rolled over or even ruptured after impact. Without these complications, the requirement to operate an emergency exit door, remove it from the aircraft and exit the aircraft is providing little more than a cursory familiarization with the situations likely to occur. It is likely that a well developed training video showing multiple scenarios would provide an equal or higher level of training value.

In most cases. Part 135 operators are smaller than the 14 CFR 121 equivalent operators and thus have fewer resources to create mock-ups for emergency exit training or create an environment that will provide realistic scenarios. Finally, fewer mock-ups designed to emulate the typical aircraft used by 14 CFR 135 operators exist in the industry that are available for hire and thus they must be built if desired to be used.

The requirement for drill training of life vest and life raft operation also presents significant logistical issues to accomplish. Several options exist for training, none of which presents realistic scenarios. Except in the most elaborate operations, the use of a swimming pool for training does not allow for introduction of realistic conditions such as swell, injuries, vest / raft puncture risk resulting from contact with the damaged aircraft, cabin flooding or potentially darkness that may be present following an actual ditching.

In any real life ditching, the crew and passengers would be constrained by the fuselage and other structures of the aircraft when donning life vests and deploying a life raft. Except when using a full-scale mock-up of at least a portion of the fuselage next to or immersed in a pool, these limitations are not easily reproduced during training. Clearly, this type of mock-up would require an enormous level of capital investment to train for an event that is statistically insignificant in likelihood.

In addition to the realism issues associated with this training, the logistical issues of locating a pool that will allow the training can present additional challenges and expenditure. Logistical issues include life raft repacking, risk of dye marker deployment, inadvertent Emergency Locator Transmitter (ELT) activation among others. Additionally, in many cases, the travel time to get to a training location can add to the overall length of training and consequently results in less efficient utility of crewmembers.

Of all the training required by 14 CFR 135.331, fire extinguisher training represents the emergency that is most likely to be encountered by crewmembers.

While this training presents other logistical issues associated with locating a suitable location for training, in addition to creating a negative impact on the environment when discharging fire-extinguishing agent, it is the most likely scenario to be encountered.

In summary, the requirement to utilize actual emergency equipment represents a significant ongoing financial burden for many 14 CFR 135 operators with no measurable increase in crewmember knowledge or safety.

Proposed Change

The proposed amendment to the rule would read

14 CFR 135.331

(a) No Change
(b) No Change
(c) Prior to acting as a crewmember on a particular make, model and, if design variations of applicable equipment or structure exist, series of aircraft, each crewmember must perform at least the following emergency drills, using the proper procedures and emergency equipment or a mock-up approved by the Administrator.
  (1) Ditching, if applicable.
  (2) Emergency evacuation.
  (3) Operation and use of emergency exits, including deployment and use of evacuation chutes, if applicable.
  (4) Use of crew and passenger oxygen.
  (5) Removal of life rafts from the aircraft, inflation of the life rafts, use of life lines, and boarding of passengers and crew, if applicable.
  (6) Donning and inflation of life vests and the use of other individual flotation devices, if applicable.
  (7) Hand held fire extinguisher operation and smoke control
(d) No Change
(e) (1) Each crewmember must receive emergency training using demonstration or another method approved by the Administrator once every 12 months on the items listed in 135.331(c)(1)-(7).
  (2) Each crewmember must perform emergency drills, using the proper emergency equipment and procedures once every 60 months on the item listed in 135.331(c)(7).

It is recognized that crewmembers may gain more familiarity with emergency equipment with initial hands-on use. The proposed changes would require that all crewmembers first qualifying on an aircraft type complete hands-on drill training using any new items. This training would include removal of the emergency exit hatch(es) as applicable. Items would only need to be trained during this training phase if they have not been previously trained for. For example, the emergency exit hatch may require drill training, whereas training on a hand-held fire extinguisher identical in design to that previously qualified on may be credited.

Following completion of initial qualification, recurrent training for all items would consist of video or other electronic media to demonstrate the necessary procedures to operate the emergency equipment. This recurrent training would be required every 12 months with grace provisions. Fire extinguisher operation would require the same recurrent training described above in addition to a hands-on drill requirement every 60 months.

Impact

No other changes to 14 CFR 135 or 14 CFR 119 are anticipated to accomplish this change. FAA Order 8400.10 would require amendment to encompass the new regulation.

Documentation

14 CFR 121.417
Exemption No. 3150, Frontier Airlines, Partial Grant of Exemption

Effect on Safety

The proposed change maintains the current level of safety with respect to crewmember proficiency and increases safety with respect to the damage and maintenance requirements associated with removing and replacing emergency exit doors.

FAA policy currently reflects the acknowledgement that certain training can be accomplished adequately through demonstration and observation. This can be seen in 14 CFR 121.417(c)(2)(ii) which allows for several drills to be completed by observation including the removal and inflation of life rafts, transfer of life rafts between doors, inflation of and use of each slide/raft pack and emergency evacuation using a slide.

The current requirements of 14 CFR 121.417(c)(1), specifically, subparagraph (i) further reinforce the position that certain training requirements need not be repeated to maintain proficiency as reflected in the one-time training requirement for Personal Breathing Equipment (PBE) use.

Due to the inherently simple design of emergency exits, the training required to remain knowledgeable in their operation is minimal. It has been shown that passengers with minimal instruction such as provided in a standard passenger briefing are capable of safely operating the doors in emergency situations.

It should be noted that most aircraft operated in accordance with 14 CFR 135 require "live" briefings as audio/visual equipment or customer service policies do not support pre-recorded briefings. On aircraft without flight attendants, a flight crewmember must provide a briefing. In such cases, giving these briefings to passengers multiple times every day leads to intimate familiarity with the content. It is safe to assume that this high level of familiarity would easily exceed the levels of information received by typical airline passengers seated in emergency exit rows and consequently responsible for the operation and removal of the exit in an emergency.

The proposed 14 CFR 135.331 requirements would require the actual operation of the emergency equipment or approved mock-up during initial qualification for each specific make, model and series. Proposed recurrent training requirements for crewmembers would include a demonstration or some other form of visual depiction showing all steps necessary to operate all emergency exits including identification of appropriate exits, actual operation and removal of the door.

Financial Impact

The financial impact of conducting the current drill training is different for each type of training. The most significant is for emergency exit training. The factors that must be considered include items such as opportunity costs and flight sub-contracting costs while the aircraft is out of service for training, maintenance actions to prepare the aircraft for training, maintenance actions to return it to service, repairs to damaged components, opportunity and flight sub-contracting costs during repairs.

An operator with approximately 2000 crewmembers and several aircraft types would need to conduct multiple recurrent classes a month to maintain the various crewmembers' currency and keep class sizes reasonable. This results in a large draw on the operator's fleet to accomplish the training.

The estimated cost for maintaining currency utilizing aircraft to accomplish the necessary drills would be approximately $950 per pilot for each training event.

Based on utilizing provisions in current regulations and guidance material, accomplishing the training on a bi-annual basis for each crewmember represents an annual cost to an operator with 2000 crewmembers of nearly $1,000,000.00.

The cost of mock-ups that meet the requirements of the guidance material in FAA Order 8400.10 is approximately $100,000 to construct the frame and an additional $70,000 to for each door type built. Additional costs include maintenance and repairs as a result of usual wear and tear. As new aircraft types are added to a fleet, the operator must constantly build new mock-ups due to the lack of commonality between manufacturers.

Risks associated with the training include dye marker deployment and subsequent clean-up costs, inadvertent Emergency Locator Transmitter (ELT) activation and other hazards associated with swimming pools such as slips, falls and illness. Costs for life raft training includes requires pool rental up to $200 per session and repacking of the raft, that can average and additional $200 per event. In an operation of the scale described above the total costs can easily exceed $20,000 per year.

Costs associated with fire extinguisher training approximately $67 per event and $17 per crewmember for an annual total of approximately $38,000 per year, in addition to environmental impacts that cannot be priced.

The total cost for an operator with 2000 crewmembers to complete the training requirements of 14 CFR 135.331 without any mock-ups would approximate $1,058,000 per year.

Contact Information

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Supporting Documentation

[Code of Federal Regulations]
[Title 14, Volume 2, Parts 60 to 139]
[Revised as of January 1, 2000]
From the U.S. Government Printing Office via GPO Access
[**CITE**: **14CFR121.417**]

[Page 469-471]

TITLE 14--AERONAUTICS AND SPACE

PART 121--OPERATING REQUIREMENTS: DOMESTIC, FLAG, AND SUPPLEMENTAL OPERATIONS--Table of Contents

Subpart N--Training Program

Sec. 121.**417** Crewmember emergency training.

(a) Each training program must provide the emergency training set forth in this section with respect to each airplane type, model, and configuration, each required crewmember, and each kind of operation conducted, insofar as appropriate for each crewmember and the certificate holder.

(b) Emergency training must provide the following:

(1) Instruction in emergency assignments and procedures, including coordination among crewmembers.

(2) Individual instruction in the location, function, and operation of emergency equipment including--

(i) Equipment used in ditching and evacuation;

(ii) First aid equipment and its proper use;

(iii) Portable fire extinguishers, with emphasis on type of extinguisher to be used on different classes of fires; and

(iv) Emergency exits in the emergency mode with the evacuation slide/raft pack attached (if applicable), with training emphasis on the operation of the exits under adverse conditions.

(3) Instruction in the handling of emergency situations including--

(i) Rapid decompression;

(ii) Fire in flight or on the surface, and smoke control procedures with emphasis on electrical equipment and related circuit breakers found in cabin areas including all galleys, service centers, lifts, lavatories and movie screens;

(iii) Ditching and other evacuation, including the evacuation of persons and their attendants, if any, who may need the assistance of another person to move expeditiously to an exit in the event of an emergency.

(iv) Illness, injury, or other abnormal situations involving passengers or crewmembers to include familiarization with the emergency medical kit; and

(v) Hijacking and other unusual situations.

(4) Review and discussion of previous aircraft accidents and incidents pertaining to actual emergency situations.

(c) Each crewmember must accomplish the following emergency training during the specified training periods, using those items of installed emergency equipment for each type of airplane in which he or she is to serve (Alternate recurrent training required by Sec. 121.433(c) of this part may be accomplished by approved pictorial presentation or demonstration):

(1) One-time emergency drill requirements to be accomplished during initial training. Each crewmember must perform--

(i) At least one approved protective breathing equipment (PBE) drill in which the crewmember combats an actual or simulated fire using at least one type of installed hand fire extinguisher or approved fire extinguisher that is appropriate for the type of actual fire or simulated fire to be fought while using the type of installed PBE required by Sec. 121.337 or approved PBE simulation device as defined by paragraph (d) of this section for combating fires aboard airplanes;

(ii) At least one approved firefighting drill in which the crewmember combats an actual fire using at least one type of installed hand fire extinguisher or approved fire extinguisher that is appropriate for the type of fire to be fought. This firefighting drill is not required if the crewmember performs the PBE drill of paragraph (c)(1)(i) by combating an actual fire; and

(iii) An emergency evacuation drill with each person egressing the airplane or approved training device using at least one type of installed emergency evacuation slide. The crewmember may either observe the airplane exits being opened in the emergency mode and the associated exit slide/raft pack being deployed and inflated, or perform the tasks resulting in the accomplishment of these actions.

(2) Additional emergency drill requirements to be accomplished during initial training and once each 24 calendar months during recurrent training. Each crewmember must--

(i) Perform the following emergency drills and operate the following equipment:

(A) Each type of emergency exit in the normal and emergency modes, including the actions and forces required in the deployment of the emergency evacuation slides;

(B) Each type of installed hand fire extinguisher;

(C) Each type of emergency oxygen system to include protective breathing equipment;

(D) Donning, use, and inflation of individual flotation means, if applicable; and

(E) Ditching, if applicable, including but not limited to, as appropriate:

(1) Cockpit preparation and procedures;

(2) Crew coordination;

(3) Passenger briefing and cabin preparation;

(4) Donning and inflation of life preservers;

(5) Use of life-lines; and

(6) Boarding of passengers and crew into raft or a slide/raft pack.

(ii) Observe the following drills:

(A) Removal from the airplane (or training device) and inflation of each type of life raft, if applicable;

(B) Transfer of each type of slide/raft pack from one door to another;

(C) Deployment, inflation, and detachment from the airplane (or training device) of each type of slide/raft pack; and

(D) Emergency evacuation including the use of a slide.

(d) After September 1, 1993, no crewmember may serve in operations under this part unless that crewmember has performed the PBE drill and the firefighting drill described by paragraphs (c)(1)(i) and (c)(1)(ii) of this section, as part of a one-time training requirement of paragraphs (c)(1) or (c)(2) of this section as appropriate. Any crewmember who performs the PBE drill and the firefighting drill prescribed in paragraphs (c)(1)(i) and (c)(1)(ii) of this section after May 26, 1987, is deemed to be in compliance with this regulation upon presentation of information or documentation, in a form and manner acceptable to the Director, Flight Standards Service, showing that the appropriate drills have been accomplished.

(e) Crewmembers who serve in operations above 25,000 feet must receive instruction in the following:

(1) Respiration.

(2) Hypoxia.

(3) Duration of consciousness without supplemental oxygen at altitude.

(4) Gas expansion.

(5) Gas bubble formation.

(6) Physical phenomena and incidents of decompression.

(f) For the purposes of this section the following definitions apply:

(1) Actual fire means an ignited combustible material, in controlled conditions, of sufficient magnitude and duration to accomplish the training objectives outlined in paragraphs (c)(1)(i) and (c)(1)(ii) of this section.

(2) Approved fire extinguisher means a training device that has been approved by the Administrator for use in meeting the training requirements of Sec. 121.**417**(c).

(3) Approved PBE simulation device means a training device that has been approved by the Administrator for use in meeting the training requirements of Sec. 121.**417**(c).

(4) Combats, in this context, means to properly fight an actual or simulated fire using an appropriate type of fire extinguisher until that fire is extinguished.

(5) Observe means to watch without participating actively in the drill.

(6) PBE drill means an emergency drill in which a crewmember demonstrates the proper use of protective breathing equipment while fighting an actual or simulated fire.

(7) Perform means to satisfactorily accomplish a prescribed emergency drill using established procedures that stress the skill of the persons involved in the drill.

(8) Simulated fire means an artificial duplication of smoke or flame used to create various aircraft firefighting scenarios, such as lavatory, galley oven, and aircraft seat fires.

[Doc. No. 9509, 35 FR 90, Jan. 3, 1970]

Editorial Note: For Federal Register citations affecting Sec. 121.**417**, see the List of CFR Sections Affected in the Finding Aids section of this volume.

Exemption No. 3150

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
WASHINGTON, D.C. 20591

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In the matter of the petition of *
*
FRONTIER AIRLINES, INC., * Regulatory Docket No. 21249
*
for exemption from Section *
121.417(c)(1) of the Federal *
Aviation Regulations *
*
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PARTIAL GRANT OF EXEMPTION

By letter dated December 17, 1980, and by telex message dated January 7, 1981, Mr. R. J. Orr, Vice President, Flight Operations, Frontier Airlines, Inc. (Frontier), 8250 Smith Road, Denver, Colorado 80207, petitioned for an exemption from Section 121.417(c)(1) of the Federal Aviation Regulations (FAR) to allow for crewmember recurrent training on the operation of emergency exits by using pictorial presentations until May 1, 1981. This will allow ample time for delivery of the emergency-training device.

Section 121.417(c) provides, in pertinent part, that each crewmember must perform certain emergency drills and (except with respect to the equipment specified in paragraphs (c)(6)(v), (vi), and (vii) of this paragraph) actually operate certain emergency equipment during initial training and once each 24 calendar months during recurrent training on each type of aircraft in which he/she is to serve. Each crewmember is only required to participate in one emergency evacuation using a slide during initial training. (Alternate recurrent periods required by Section 121.433(c) may be accomplished by approved pictorial presentation or demonstration.)

Section 121.417(c)(1) provides, in pertinent part, that each type of emergency exit in the normal and emergency exit modes, including the actions and forces required in the deployment of the emergency evacuation slides, must be demonstrated.

In support of the request, the petitioner states:

1. All Frontier crewmembers during initial training receive training by actually operating the emergency exits using line aircraft. Subsequent recurrent training on emergency exits has been conducted using an approved pictorial means.

2. Line aircraft can be used for initial training because the length of the training period (6 weeks) provides sufficient flexibility to schedule the required individual hands-on training when a line aircraft is available. It is seldom possible to be assured of the availability of a line aircraft during the 2 days of recurrent training without removing an aircraft from scheduled service.

3. Each initial trainee will continue to receive the required hands-on training. The requested temporary exemption will affect the recurrent training of approximately 50 percent of the B737 and CV580 crewmembers. In effect, the training required by Section 121.417(c)(1) will be delayed for approximately 5 months. With the delivery of approved training devices in April 1981, all recurrent emergency exit training will use the training devices.

4. Petitioner believes that good cause is shown for relief of the requirement that the date of the petition for exemption precede the effective date of the exemption by 120 days.

Frontier placed orders for the emergency exit training devices in September 1979. It was not until mid-October 1980 that it was learned that the promised November 1980 delivery of the trainers would not be met. Frontier, in good faith, took appropriate action, in a timely manner, to achieve compliance with Section 121.417(c)(1).

5. The promised delivery date of the training devices is now April 6, 1981. When the trainers are installed, its training plans include hands-on training for all crewmembers during their annual recurrent training.

6. Petitioner contends that safety will not be affected if Frontier is permitted to use an approved pictorial means for the recurrent training on emergency exits.

The Federal Aviation Administration (FAA) concludes that the petitioner has diligently attempted (as early as September 1979) to procure the necessary mockups to permit completion of the hands-on emergency training of all crewmembers prior to the September 29, 1980, deadline established for compliance with Section 121.417(c)(1). The FAA also concludes that Frontier's circumstances are unique because of late delivery of the training mockups necessary to perform the training. Delivery of these devices from Burtek, Inc., the sole-source manufacturer, is now scheduled for April 6, 1981. The requested grant of exemption would not adversely affect safety. The FAA further concludes that the exemption should be limited to May 1, 1981, since after that date that the necessary training and drills can be performed using the mockups.

The FAA has determined that using the pictorial presentation for operation of emergency exits for crewmembers for recurrent training and meeting the conditions and limitations of this exemption would provide an equivalent level of safety.

In consideration of the foregoing, I find that a partial grant of exemption would be in the public interest. Therefore, pursuant to the authority contained in Sections 313(a) and 601(c) of the Federal Aviation Act of 1958, delegated to me by the Administrator (14 CFR 11.53), Frontier Airlines, Inc., is granted an exemption from Section 121.417(c)(1) of the FAR to the extent necessary to permit use of pictorial presentations for operation of emergency exits for crewmembers for recurrent training. This exemption is subject to the following conditions and limitations:

1. This exemption shall be subject to any other conditions or limitations that the FAA certificate-holding office shall deem appropriate.

2. Frontier will provide its FAA certificate-holding office with a monthly status report on training progress following implementation of the training aids until expiration of this exemption.

This exemption terminates on May 1, 1981, unless sooner superseded or rescinded.

/s/ Kenneth S. Hunt
Director of
Flight Operations

Issued in Washington, D.C., on
February 24, 1981.

VS-81-127-E